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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* TAKAAKI KUTSUNA and TAKESHI KOYAMA

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Appeal 2010-009405  
Application 10/602,637<sup>1</sup>  
Technology Center 1700

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Before CHUNG K. PAK, JEFFREY T. SMITH, and  
KAREN M. HASTINGS, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection<sup>2</sup> of claims 1, 2, 6, and 8 through 25. We have jurisdiction pursuant to 35 U.S.C. § 6.

We AFFIRM-IN-PART.

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<sup>1</sup> Application 10/602,637 (Application'637), filed on June 25, 2003.

<sup>2</sup> Office action mailed December 10, 2008 ("Final Rejection"; cited as "FR").

## INTRODUCTION

Details of the appealed subject matter are recited in representative appealed claims 1 and 23 of Application'637, which are reproduced below from the Claims Appendix to the Appeal Brief<sup>3</sup>:

1. A fuel system comprising a fuel vessel, molded parts for the fuel vessel and/or a tube for a fuel in which bodies thereof are constituted from a thermoplastic resin and/or a rubber, wherein:

*a coating layer is formed on the surfaces in at least one sides of the insides and the outsides of the fuel vessel body, the molded part bodies for the fuel vessel and/or the tube body for a fuel or at least one of connected parts in these bodies;*

*the above coating layer is formed by curing an epoxy resin composition comprising an epoxy resin and an epoxy resin curing agent as principal components;*

*the above coating layer, which is barrier layer for gasoline, has a gasoline permeability coefficient of  $2 \text{ g}\cdot\text{mm}/\text{m}^2\cdot\text{day}$  or less at  $60^\circ\text{C}$  and a relative humidity of 60% RH;*

*the epoxy resin described above comprises at least one selected from an epoxy resin having a glycidylamine part derived from metaxylylenediamine, and an epoxy resin having a glycidylamine part derived from 1,3-bis(aminomethyl)-cyclohexane; and*

*the epoxy resin curing agent comprises a reaction product of (A) and (B) or a reaction product of (A), (B) and (C):*

*(A) metaxylylenediamine or paraxylylenediamine,*

*(B) a multifunctional compound having at least one acyl group which can form an amide group part by reacting with polyamine to form an oligomer, the multifunctional compound being selected from the group consisting of acrylic acid,*

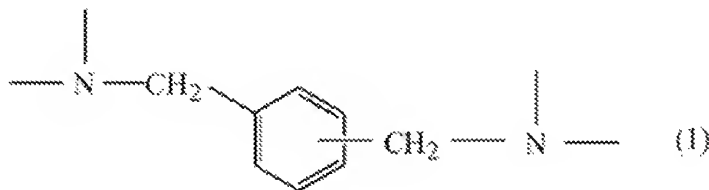
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<sup>3</sup> Appeal Brief filed on June 10, 2009 ("App. Br.").

methacrylic acid, and derivatives of acrylic acid, methacrylic acid, maleic acid, fumaric acid, succinic acid, malic acid, tartaric acid, pyromellitic acid and trimellitic acid, and

(C) monovalent carboxylic acid having 1 to 8 carbon atoms and/or a derivative thereof; and

the coating layer contains skeletal structure represented by the following formula (1)



in an amount of 30% by weight or more based on the weight of the coating layer.

23. The fuel system as described in claim 1, wherein said epoxy resin includes an epoxy resin having a glycidylamine part derived from 1,3-bis(aminomethyl)-cyclohexane.

(emphasis added).

Appellants seek review of the following grounds of rejection maintained by the Examiner in the Answer<sup>4</sup>:

(1) Claims 1, 2, 6, 8 through 22, 24, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Gerdes<sup>5</sup>, Tashiro<sup>6</sup>, and Huang<sup>7</sup>; and

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<sup>4</sup> Examiner's Answer mailed on November 2, 2009 ("Ans."). In the Answer, the Examiner withdrew the rejection of claim 23 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Gerdes, Tashiro, and Watanabe. Ans. 2.

(2) Claim 23 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Gerdes, Tashiro, and Huang, as applied to claim 1 above, further combined with Watanabe.<sup>8,9</sup>

## DISCUSSION

### *REJECTION (1) of claims 1, 2, 6, 8 through 22, 24, and 25*

As a preliminary manner, Appellants do not raise distinct arguments of patentability of the subject matter recited in claims 2, 6, 8 through 22, 24, and 25. App. Br. 11-31. Accordingly, we select claim 1 as representative and confine our discussion to this selected claim. Claims 2, 6, 8 through 22, 24, and 25 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants argue that the teachings of Gerdes, Tashiro, and Huang are not properly combinable under 35 U.S.C. § 103(a). App. Br. 11. Appellants argue further that even assuming, *arguendo*, that the teachings of those references were properly combinable under 35 U.S.C. § 103(a), the teachings of the three cited references as applied by the Examiner would not have suggested a fuel system having a coating layer as recited in appealed

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<sup>5</sup> United States Patent No. 4,719,135, issued to Ernst Gerdes on January 12, 1988.

<sup>6</sup> United States Patent No. 3,704,229, issued to Hiro Tashiro on November 28, 1972.

<sup>7</sup> United States Patent No. 3,683,044, issued to Ching Yun Huang on August 8, 1972.

<sup>8</sup> United States Patent No. 5,474,853, issued to Noriyoshi Watanabe on December 12, 1995.

<sup>9</sup> In the Examiner's Answer, the Examiner introduced the rejection of claim 23 as a new ground of rejection. Ans. 3-4.

claim 1. App. Br. 11-12. Appellants argue further that “even assuming, *arguendo*, that the teachings of the applied references would have established a *prima facie* case of obviousness, the evidence of record [i.e., the showing in Appellants’ Specification and in the Declaration filed under 37 C.F.R. § 1.132, executed by Shinichi Yonehama on August 11, 2008, filed on September 2, 2008 (“Yonehama Declaration”)] . . . overcomes such *prima facie* case of obviousness, and establishes unobviousness of the presently claimed invention.” App. Br. 12-13.

Thus, the issues presented here are:

(1) Has the Examiner reversibly erred in determining that one of ordinary skill in the art from the teachings of Gerdes, Huang, and Tashiro would have been led to a fuel system having a coating layer that:

(a) has the gasoline permeability coefficient recited in appealed claim 1;

(b) is formed by curing an epoxy resin composition comprising the particular epoxy resin and the particular epoxy curing agent as recited in appealed claim 1; and

(c) contains the skeletal structure represented by formula (1) in the amount as recited in appealed claim 1?

(2) If so, have Appellants demonstrated that the evidence of secondary considerations relied upon is sufficient to overcome the *prima facie* case of obviousness?

On this record, we answer both Questions (1) and (2) in the negative. Our reasons follow:

There is no dispute that Gerdes discloses a fuel system comprising a fuel tank molded from high density polyethylene, where the external surface of said molded fuel tank has a coating layer formed by curing an epoxy composition comprising a suitable epoxy resin and a suitable amine-containing curing agent. *Compare* Ans. 5, citing col. 1, ll. 8-11, and 51-55, col. 2, ll. 41-45 and 50-55, and col. 3, ll. 36-37, *with* App. Br. 22-23, citing col. 2, ll. 1-11, 37-41, and 56-68, and col. 3, ll. 1-35.

According to Gerdes at col. 1, ll. 51-55, the object of its invention is to “provide a substantially *fuel impervious* polymeric article for the coating of a suitable varnish . . .” (emphasis added). Gerdes discloses that it is desired that the coating layer have a “suitable amount of crosslinking” for fuel impermeability. Ans. 5, citing Gerdes, col. 3, ll. 36-37. Gerdes, at col. 4, ll. 58-61, also discloses that the cured epoxy-containing coating layer “effect[s] a barrier action of 60-80% *or more* with respect to gasoline and diesel fuel, as compared with an untreated tank, at standard temperature and pressure” (emphasis added). As correctly found by the Examiner in the Answer, p. 5, the Gerdes description of its coating layer having “fuel impermeability,” i.e., no fuel permeability, is within the gasoline barrier layer limitation having “a gasoline permeability coefficient of 2 g·mm/m<sup>2</sup>·day *or less* at 60°C and a relative humidity of 60% RH” (emphasis added), recited in appealed claim 1. Thus, Appellants’ argument that Gerdes does not teach or suggest a coating layer having the specified gasoline permeability coefficient recited in appealed claim 1 in the Appeal Brief, pp. 11 and 24, is not persuasive.

As recognized by the Examiner, Gerdes does not specifically identify its suitable epoxy resin as an “epoxy resin having a glycidylamine part” as recited in appealed claim 1 or its suitable amine curing agent as a reaction product of (A) metaxylylenediamine or paraxylylenediamine and (B) “a multifunctional compound having at least one acyl group which can form an amide group part by reacting with polyamine to form an oligomer” as recited in appealed claim 1. Ans. 5.

However, as acknowledged by Appellants in the Appeal Brief, p. 22, Gerdes discloses that “suitable epoxy resins are those containing more than one epoxide group, e.g., 1.5-5, in the monomeric unit. See column 2, lines 56-58.” Appellants further acknowledged that Gerdes, at col.3, ll. 1-35, discloses examples of suitable curing agents “for use in forming the fuel impervious polymeric article of Gerdes, et al.” App. Br. 22-23. According to Gerdes at col. 3, ll. 1-3 and 20-21, suitable curing agents are “those structured on amine basis to permit curing to occur at room temperature at suitable rates . . . preferably 2,2,4-trimethylhexamethylenediamine, the xylidenediamines . . .” (emphasis added). The Gerdes disclosure of “xylidenediamines” as examples of preferred amine curing agents appears to contradict Appellants’ argument that there is no disclosure in Gerdes of using xylylenediamines. App. Br. 23-25.

The Examiner correctly finds that Huang teaches “an epoxy resin having a glycidylamine part derived from metaxylylenediamine” as recited in appealed claim 1. Ans. 6, *citing* col. 2, ll. 1-6. *Also see*, Example 1 of Huang at col. 5, ll. 64 to col. 6, ll. 18, which describes a glycidylamine resin, which is obtained by reacting metaxylylenediamine and epichlorohydrin,

having an epoxy equivalent of 123. According to Huang at col. 3, ll. 56-61, triglycidyl xylyleneidamine having an epoxy equivalent of 101 has three glycidyl groups bonded to one molecule of xylylenediamine; while diglycidyl xylylenediamine, having an epoxy equivalent of 124 has two glycidyl groups bonded to one molecule of xylylenediamine. Based on the teachings of Huang, the Huang glycidylamine resin in Example 1, which has an epoxy equivalent of 123, has from two or more to less than three glycidyl [i.e., epoxide] groups bonded to one molecule of metaxylylenediamine. The Huang Example 1 glycidylamine resin is within the Gerdes teachings of suitable epoxy resins containing more than one epoxide group, e.g., 1.5-5, in a monomeric unit, as discussed above.

As acknowledged by Appellants in the Appeal Brief, p. 27, Huang, at col. 4, ll. 37-41, discloses that its glycidylamine resin can be “readily cured with the aid of curing agents customarily used for curing of glycidyl compounds, such as aliphatic or aromatic polyamines.” In the Huang Example 1 at col. 6, l. 49, Huang exemplifies the use of the aromatic polyamine curing agent, metaxylylenediamine. The use of the metaxylylenediamine curing agent disclosed by Huang is also within the Gerdes teachings of suitable amine curing agents, e.g., the preferred xylidenediamines. As correctly found by the Examiner, the Huang cured glycidylamine resin has excellent heat resistance. *Id.*, citing col. 5, ll. 57-59. As acknowledged further by Appellants in the Appeal Brief, *id.*, Huang also discloses that its glycidylamine resin “has a relatively low viscosity resulting in a good workability, and gives cured products exhibiting a high heat temperature distortion. Note column 1, lines 6-9 and 61-67.”

Further, the Examiner correctly finds that Tashiro teaches an amine curing agent that is formed by reacting metaxylylenediamine with an acrylic acid ester. Ans. 5, *citing* col. 1, ll. 28-31 and 59-63, and col. 2, l. 14. As acknowledged by Appellants, the Tashiro amine curing agent is the reaction product of (A) an acrylic or methacrylic acid ester, (B) a slightly water-soluble or insoluble aliphatic amine having a primary amine radical or an amine mixture therefore, and (C) a xylylenediamine having a specified structural formula and having both properties of aliphatic amine and aromatic amine, and a 70:30 mixture of metaxylylenediamine and paraxylylenediamine. App.Br. 27, *citing* col. 1, l. 59, to col. 2, l. 16, and col. 2, ll. 17-49. The Tashiro reactant (C) meets the reactant (A) recited in appealed claim 1. The Tashiro reactant (A), i.e., acrylic acid ester, is within the compositional limitation of the reactant (B) recited in appealed claim 1. According to Tashiro at col. 2, ll. 44-46, 0.8 to 1.0 mole of the xylylenediamine reactant (C) is added to one mole of ester groups at the terminals of the reaction product of (B), (C), and (A) “to effect amidation [i.e., forming an amide].” The Tashiro reactant (A), i.e., (meth)acrylic acid ester, meets the limitation that the multifunctional compound (B) acyl group “can form an amide group part by reacting with polyamine to form an oligomer” recited in appealed claim 1.

Appellants argue that because the Tashiro amine curing agent is obtained by the three reactants (A), (B), and (C), it is “completely different from the reaction products of present claim 1 utilized as the curing agent.” App. Br. 19. However, the language in appealed claim 1, i.e., “a reaction product of (A) and (B),” does not exclude the additional Tashiro reaction

component (B). Therefore, the Tashiro amine curing agent is within the compositional limitations of the reaction product of (A) and (B) recited in appealed claim 1.

The Tashiro amine curing agent is also within the teachings of both Gerdes and Huang of using aromatic amine curing agents for curing epoxy resin compositions. As acknowledged by Appellants in the Appeal Brief, p. 27, Tashiro discloses that its amine curing agent can be used for epoxy resin compositions “having room temperature curability.” In addition, Tashiro teaches that its amine curing agent is less toxic. *See Abstract.*

Notwithstanding Appellants’ arguments to the contrary, for the reasons discussed above, Huang provides reason or suggestion for a person having ordinary skill in the art to use its glycidylamine resin as the suitable epoxy resin in forming the cured epoxy coating layer in the fuel system disclosed by Gerdes; and Tashiro provides reason or suggestion for a person having ordinary skill in the art to use its aromatic amine-containing curing agent as the suitable amine curing agent of the cured epoxy coating layer suggested by the combined teachings of Gerdes and Huang. As also indicated *supra*, Gerdes teaches that the desired fuel impermeability can be achieved via a “suitable amount of crosslinking” of the suitable epoxy coating, inclusive of the glycidylamine resin taught by Huang.

Given the above factual circumstances, we concur with the Examiner that one of ordinary skill in the art would have been led to a fuel system having an epoxy cure coating layer having a gasoline permeability of  $2 \text{ g} \cdot \text{mm}/\text{m}^2 \cdot \text{day}$  or less at  $60^\circ\text{C}$  and a relative humidity of 60% RH formed from the epoxy resin and the epoxy curing agent recited in appealed claim 1

in view of the collective teachings of Gerdes, Huang, and Tashiro. Regarding the amount of the skeletal structure represented by formula (1) in the epoxy coating recited in appealed claim 1, it would have been reasonably expected by one of ordinary skill in the art from the suggestion of Gerdes, Hwang, and Tashiro regarding the use of the particular amounts of the epoxy resin and the epoxy resin curing agent recited in claim 1 or would have naturally flowed from following the suggestion of Gerdes, Hwang, and Tashiro regarding the use of particular amounts of the epoxy resin and the epoxy resin curing agent recited in claim 1. *See, e.g., In re Kubin*, 561 F.3d 1351, 1357 (Fed. Cir. 2009) ("Even if no prior art of record explicitly discusses the [limitation], [applicants'] application itself instruct that [the limitation] is not an additional requirement imposed by the claims on the [claimed invention], but rather a property necessarily present in [the claimed invention]"); *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985) ("The fact that appellant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the difference would otherwise have been obvious.")

Appellants' arguments in the Appeal Brief, pp. 25-26 and 31, that the combined teachings of the cited references would not have provided a cured coating layer comprising 30% by weight or more of the skeletal structure of formula (1) as recited in appealed claim 1 are not persuasive. According to Appellants, if the aliphatic amine curing agents in the coating formulation disclosed in the Gerdes Example are replaced with xylylenediamine, the resultant cured coating layer would comprise the skeletal structure of formula (1) in an amount smaller than 17% by weight of the coating layer.

App. Br. 25-26. However, Appellants' calculation or determination is not based on the epoxy coating layer suggested by the collective teachings of Gerdes, Huang, and Tashiro since it does not take into account the glycidylamine resin exemplified and suggested by Huang in the amount suggested by Gerdes.<sup>10</sup> Thus, on this record, Appellants have not shown that a cured coating layer comprising 30% by weight or more of the skeletal structure of formula (1) as recited in appealed claim 1 would not have been reasonably expected by one of ordinary skill in the art or would not have naturally flowed from the suggestion of Gerdes, Hwang, and Tashiro regarding the use of the particular amounts of the particular epoxy resin and the particular epoxy resin curing agent recited in claim 1.

We also do not subscribe to Appellants' position that Huang and Tashiro are nonanalogous art to the fuel system disclosed by Gerdes and the fuel system of the present invention. App. Br. 11, 28-31. First, Appellants' position is flawed since it appears to be based on a wrong legal standard. Both *In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992) and *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992) require that for a prior art reference to be analogous, the reference must be "in the field of applicant's endeavor" or, if

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<sup>10</sup> For example, when the epoxy resin in the Gerdes Example coating formulation is replaced with the Huang Example 1 glycidylamine resin obtained by reacting metaxylylenediamine and epichlorohydrin, the resultant cured coating layer would comprise the skeletal structure of formula (1) in an amount of 74% by weight [i.e.,  $(59+5.67)/(59+5.67+7+7.79+6.38+1.70)$ ]. The amount of 74% by weight is within the amount range of 30% by weight or more recited in appealed claim 1.

not, the reference must be "reasonably pertinent to the particular problem with which the inventor was concerned."

In any event, the disclosures of Huang and Tashiro are deemed analogous art even under the *Clay* test since they are reasonably pertinent to the particular problem with which Gerdes and the inventors are concerned. In particular, we find that the subject matter described in both Huang and Tashiro, which is like the subject matter in Gerdes and that claimed by Appellants, is directed to curing epoxy resin compositions comprising an epoxy resin and an amine-containing curing agent. For example, as found by the Examiner, the Huang cured glycidylamine resin is said to have excellent heat resistance. According to the "Description of the Related Art" in Appellants' Specification at p. 1, l. 20 to p. 2, l. 1, [w]hen a fuel vessel is loaded in automobiles, various performances such as a heat resistance, a water resistance and an impact resistance are required to the vessel."

Accordingly, we hold that the teachings of Gerdes, Huang, and Tashiro are combinable and that combination would have rendered a fuel system having the curing epoxy compositions recited in appealed claim 1 *prima facie* obvious within the meaning of 35 U.S.C. § 103(a).

After a *prima facie* case of obviousness has been established, the burden shifts to Appellants to come forward with evidence of non-obviousness. *In re Dillon*, 919 F.2d 688, 692-93 (Fed. Cir. 1990)(*en banc*).

Appellants' arguments in the Appeal Brief, pp. 12-13, that the evidence of secondary considerations, i.e., unexpected advantages of unexpectedly low gasoline permeability coefficient while having good

mechanical properties as shown in the Specification examples and the Yonehama Declaration, would overcome the *prima facie* case of obviousness and “establish unobviousness of the presently claimed invention” are not persuasive.

When an obviousness rejection is based on a combination of the prior art reference as here, the comparison to show unexpected results need only be between the closes prior art reference and the claimed invention. *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991); *In re Chapman*, 357 F.2d 418, 422 (CCPA 1966). It need not be between the claimed invention and the invention suggested by the combined teachings of the prior art references. *Chapman*, 357 F.2d at 422. To do so would require Appellants to compare the claimed invention against itself.

An indirect comparison of the claimed invention against the closest prior art with respect to unexpected results is also permissible. *See, e.g., In re Boesch*, 617 F.2d 272, 276-277 (CCPA 1980) (*citing In re Payne*, 606 F.2d at 316, and cases cited therein) (“proof of unexpected properties may be in the form of direct or indirect comparative testing of the claimed compounds (here, alloys) and the closest prior art”); *see also In re Blondel*, 499 F.2d 1311, 1317 (CCPA 1974). To that end, Appellants may compare the claimed invention with something closer than the closest prior art to indirectly show that the claimed invention imparts unexpected results relative to the closest prior art. However, in such case, Appellants must establish that the asserted indirect evidence demonstrates unexpected results for the claimed invention relative to the closest prior art. *See, e.g., In re Blondel*, 499 F.2d at 1317 (“Appellants’ brief goes through a detailed, step-

by-step analysis of the evidence in support of the conclusion to be drawn from the indirect comparison,” establishing that the indirect evidence provided a reliable indication of the performance of the closest claimed and prior art compounds).

Here, we agree with the Examiner’s conclusion that the showings in the Yonehama Declaration and the Specification examples relied upon by Appellants do not directly or indirectly compare the claimed invention against the closest prior art, Gerdes. As noted by the Appellants in the Appeal Brief at pp. 25-26, the epoxy coating composition described in the Gerdes Example comprises not only the epoxy resin [sold under the trademark EPIKOTE 828] and amine curing agents, but 7 parts by weight of a flexibilizer which reacts with the epoxy resin to form a different epoxy resin. See the Gerdes Example at col. 5, ll. 11-13, which uses the flexibilizer sold under the tradename DESMOCAP 11 by Bayer. Gerdes, at col. 3, ll. 58-62, identifies the DESMOCAP 11 flexibilizer as an isocyanate-containing prepolymer. According to Gerdes, “a certain flexibility of the varnish film [cured coating layer] is greatly preferred in order to obtain suitable elasticity, improved impact strength and shock resistance. For this purpose, the epoxy resin varnish comprising of the epoxy and amine curing agent is preferably combined with a suitable flexibilizer.” Col. 3, ll. 52-57. Gerdes also discloses that it is believed that “the crosslinkable NCO groups in these prepolymers [of the flexibilizers] react under crosslinking conditions with the diamine curing agent component.” Col. 3, ll. 64-66. Gerdes further teaches that greater impermeability than that exemplified in its examples can be achieved by a suitable amount of a crosslinking as indicated *supra*. Yet,

none of the comparative examples in Appellants' Specification or the Additional Comparative Examples 1 and 2 in the Yonehama Declaration exemplify such an epoxy coating product directly or indirectly. In Appellants' Comparative example 4 of the Specification, the coating composition comprises 33 parts by weight of the curing agent F, 50 parts by weight of an epoxy resin having a glycidylamine part derived from metaxylylenediamine, and 0.02 parts by weight of an acryl base wetting agent. Appellants' Specification, p. 49. In Additional Comparative Examples 1 and 2 in the Yonehama Declaration, the coating composition comprises 40 parts by weight of the Tashiro Example 1 curing agent and 60 parts by weight of the EPIKOTE 828 epoxy resin. See the Yonehama Declaration, p 2.

Moreover, Appellants have not demonstrated that the showings in the Specification and in the Declaration are reasonably commensurate in scope with appealed claim 1. *In re Grasselli*, 713 F.2d 731,743 (Fed. Cir. 1983), quoting *In re Tiffin*, 448 F.2d 791, 792 (CCPA 1971) ("It is well settled 'that objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'") While the showings are limited to a specific acrylonitrile-butadiene molded rubber tube filled with a specific coating composition comprising 50 parts by weight of a specific epoxy resin having a glycidylamine part derived from metaxylylenediamine, 115 parts by weight of a specific epoxy resin curing agent obtained by reacting one mole of metaxylilenediamine and 0.67 mole of methyl acrylate, and 0.02 part by weight of the acryl base wetting agent, claim 1 is not so limited. On this record, Appellants have not evinced that

these showings are also applicable to the materially different coating compositions and thermoplastic resin or rubber bodies covered by claim 1.

Accordingly, having fully considered the evidence and arguments advanced by both the Examiner and Appellants, we determine that the preponderance of evidence weighs most heavily in favor of obviousness of the invention recited in claims 1, 2, 6, 8 through 22, 24, and 25 within the meaning of 35 U.S.C. § 103(a).

*REJECTION (2) of claim 23*

Claim 23 was rejected over the collective teachings of Gerdes, Tashiro, Huang, and Watanabe for the reasons discussed in the Examiner's Answer, pp. 3-4. Appellants contend that the combined teachings of the cited references would not have suggested a fuel system having a coating layer formed by curing an epoxy resin having a glycidylamine part derived from 1,3-bis(aminomethyle)-cyclohexane, where the coating layer having epoxy resin also contains the skeletal structure represented by formula (1) in an amount thereof as recited in appealed claim 23. App. Br. 32-33; Reply Br.<sup>11</sup> 5.

Thus, the issue presented here is: Has the Examiner reversibly erred in determining that the combined teachings of the cited references would have suggested a fuel system having a cured epoxy resin coating layer comprising an epoxy resin having a glycidylamine part derived from 1,3-bis(aminomethyle)-cyclohexane and the skeletal structure represented by formula (1) in the amount of 30 % by weight or more based on the weight of

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<sup>11</sup> Reply Brief ("Reply Br.") filed on January 4, 2010.

the coating layer, as recited in appealed claim 23? On this record, we answer the question in the affirmative. Our reasons follow:

According to the Examiner, “Watanabe et al. teaches an epoxy resin having a glycidylamine part derived from bis(aminomethyl)-cyclohexane (column 7, lines 38-41) for the purpose of obtaining cured products having improved rigidity (column 7, line 5).” Ans. 3. The Examiner urges that because Gerdes teaches that the blending portion of the epoxy resin to the epoxy resin curing agent falls in the range of 1.2 to 3.0 in terms of the ratio of active hydrogen to epoxy group, the skeletal structure of formula (1) would therefore be contained in the coating layer in the amount of 30% by weight. Ans. 4, citing Gerdes, col. 3, l. 65, to col. 4, l. 2.

However, contrary to the Examiner’s statement, Watanabe, at col. 7, ll. 5, does not disclose that the particular epoxy resin improves the rigidity of the cured product. Rather, Watanabe attributes the rigidity improvement to the use of the particular inorganic filler, wollastonite. Moreover, Watanabe at col. 7, ll. 38-41, merely discloses that examples of the glycidylamine type epoxy resin include “an epoxy resin produced from epichlorohydrin and . . . bis(aminomethyl)cyclohexane.” On this record, the Examiner has not shown why or how the use of the Watanabe glycidylamine epoxy resin, which does not appear to have any phenylene groups, i.e., the skeletal structure represented by formula (1) included in appealed claim 23, as the epoxy resin in the coating composition of Gerdes as proposed by the Examiner would have provided an epoxy coating layer comprising the skeletal structure of formula (1) in an amount of 30% by weight or more based on the weight of the layer included in appealed claim 23. Indeed, when the Watanabe epoxy

resin is used as the epoxy resin in the coating composition of Gerdes, as exemplified in the Gerdes Example, which is reproduced in Appellants' Appeal Brief, p. 25, the amount of the skeletal structure of formula (1) would be much less than the minimum 30% by weight based on the weight of the coating layer recited in appealed claim 1.

Furthermore, the Examiner has failed to show that the cited references would have prompted a person having ordinary skill in the art to use the Watanabe resin in the coating composition suggested by the combined teachings of Gerdes, Huang, and Tashiro. In particular, the Examiner has not shown that the polyglycidyl xylylenediamine resin suggested by Huang would be useful with the particular epoxy resin taught by Watanabe. For example, according to Huang, its polyglycidyl xylylenediamine resin can be used alone or combined with known glycidyl ethers of polyhydric phenol having 1,2-epoxy equivalency greater than one, e.g., a commercially available novolak-type epoxy resin. Col. 5, ll. 21-48. Nor has the Examiner shown that the Watanabe epoxy resin comprises more than one epoxide group, e.g., 1.5-5, in the monomeric unit, as required by Gerdes.

Accordingly, we concur with Appellants that the Examiner has not established a prima facie case of obviousness regarding the subject matter recited in claim 23 within the meaning of 35 U.S.C. § 103(a).

#### ORDER

We AFFIRM the REJECTION of claims 1, 2, 6, 8 through 22, 24, and 25 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Gerdes, Tashiro, and Huang.

We REVERSE the REJECTION of claim 23 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Gerdes, Tashiro, Huang, and Watanabe.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

**AFFIRMED-IN-PART**

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